

WO 2005/017000 A1

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



**(43) International Publication Date
24 February 2005 (24.02.2005)**

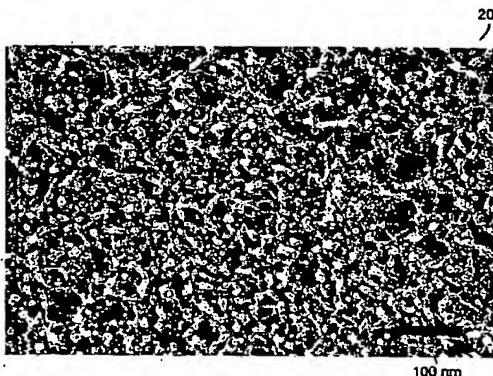
PCT

**(10) International Publication Number
WO 2005/017000 A1**

- (51) International Patent Classification⁷:** C08J 3/075, A61L 27/16, C08F 283/01
- (21) International Application Number:** PCT/US2004/003135
- (22) International Filing Date:** 4 February 2004 (04.02.2004)
- (25) Filing Language:** English
- (26) Publication Language:** English
- (30) Priority Data:**
10/631,491 31 July 2003 (31.07.2003) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:**
US Not furnished (CON)
Filed on Not furnished
US 10/631,491 (CIP)
Filed on 31 July 2004 (31.07.2004)
- (71) Applicant (for all designated States except US):** CAMBRIDGE POLYMER GROUP [US/US]; 52-R Roland Street, Boston, MA 02129-1234 (US).
- (72) Inventors; and**
(75) Inventors/Applicants (for US only): RUBERTI, Jeffrey, W. [US/US]; 47 School Street, Lexington, MA 02421 (US). BRAITHWAITE, Gavin, J., C. [GB/US]; 860 Massachusetts Avenue, Unit 850-10, Cambridge, MA 02139-3026 (US).
- (74) Agents:** GREWAL, Monica et al.; Bowditch & Dewey, LLP, 161 Worcester Road, Framingham, MA 01701-9320 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US (patent), UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW).

[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR CONTROLLING AND FORMING POLYMER GELS



200

100 nm

(57) Abstract: In preferred embodiments, the present invention provides methods of controllably making a vinyl polymer hydrogel having desired physical properties without chemical cross links or radiation. The gelation process is modulated by controlling, for example, the temperature of a resultant vinyl polymer mixture having a gellant or using active ingredients provided in an inactive gellant complex. In accordance with a preferred embodiment, the method of manufacturing a vinyl polymer hydrogel includes the steps of providing a vinyl polymer solution comprising a vinyl polymer dissolved in a first solvent; heating the vinyl polymer solution to a temperature elevated above the melting point of the physical associations of the vinyl polymer, mixing the vinyl polymer solution with a gellant, wherein the resulting mixture has a higher Flory interaction parameter than the vinyl polymer solution; inducing gelation of the mixture of vinyl polymer solution and gellant; and controlling the gelation rate to form a viscoelastic solution, wherein workability is maintained for a predetermined period, thereby making a vinyl polymer hydrogel having the desired physical property. In further preferred embodiments, the present invention provides physically crosslinked hydrogels produced by controlled gelation of viscoelastic solution wherein workability is maintained for a predetermined period. In another aspect, the present invention provides kits for use in repairing intervertebral disks or articulated joints including components that form the vinyl polymer hydrogel and a dispenser.

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Published:

- *with international search report*